IFT13

ANNUAL MEETING + FOOD EXPO®

July 13–16, 2013
McCormick Place South
Chicago, Illinois USA

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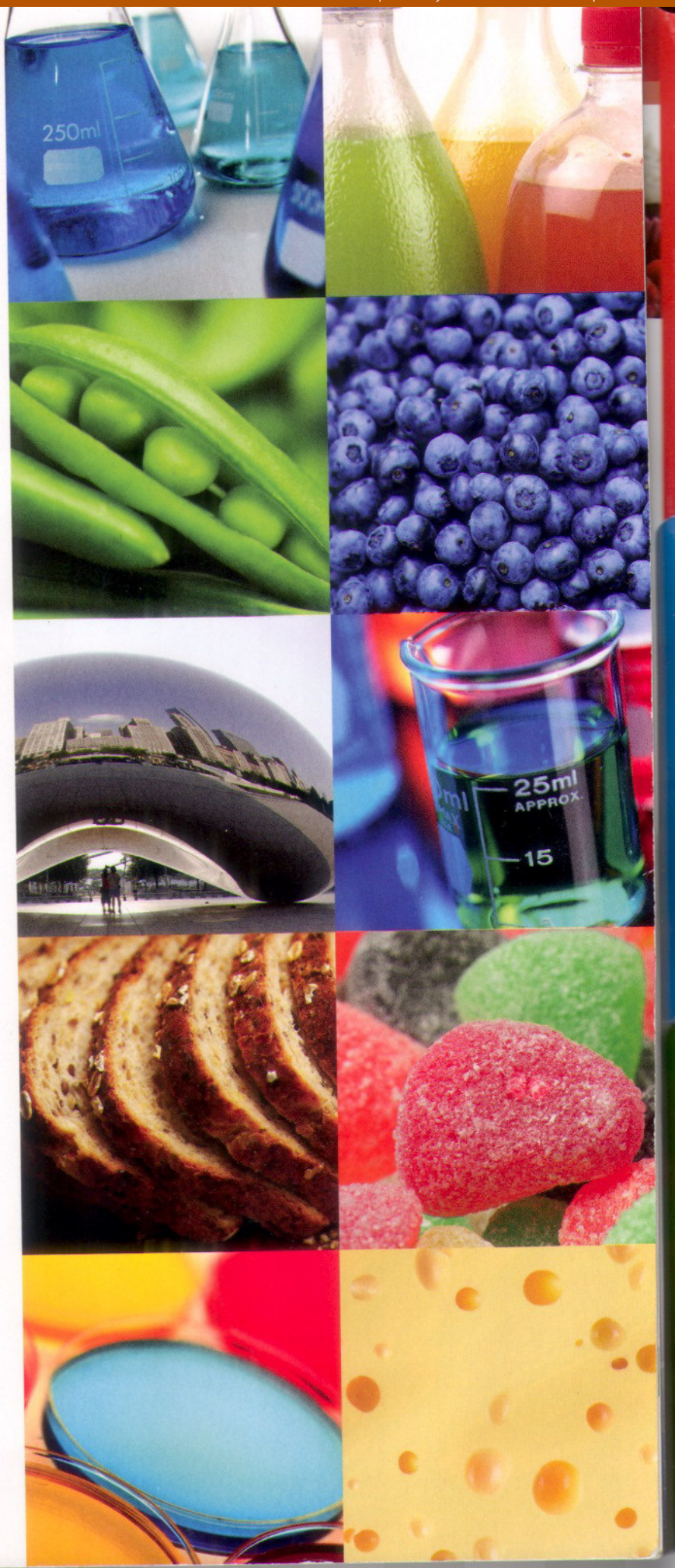

Structural characterization of heat-induced whey protein hydrogels produced under the effects of moderate electric fields.

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Whey protein based gelling systems may present several functional roles in food formulations by enhancing textural properties (e.g. mouthfeel), acting as stabilizing agents or by being used as carrier of biologically active substances (e.g. pharmaceuticals). The rates and pathways for the production of a protein gel system are controlled by heating conditions, protein concentration, pH, ionic strength, and solvent medium. The combination of heat and electric treatment has the potential to interfere with unfolding and aggregation of whey proteins and thus with the protein-protein interactions. The general objective of this study was to evaluate and understand the effects of electric fields (EF) on properties of liquid dispersions of whey protein and hydrogels made thereof. The results show that use of EF in combination with heating treatments (at 90 ºC for 20 minutes) modifies rheological behavior of the produced hydrogels, which presented nearly identical values for G‘ and G‘‘ or alternatively higher G‘‘ than G. Through dynamic light scattering and size measurements was possible to observe that EF treatment applied around critical particulate gel formation conditions (pH near isolectric point and high ionic strength medium) resulted in a whey gel less prone to formation of large aggregates and protein sedimentation. Structural characterization was assessed by dissolving the formed gels in various reducing and non-reducing buffers. Results showed that the hydrogel formed under an EF was almost completely solubilized in water (> 60 %) and largely soluble in NaCl 6M (> 30%), SDS or urea (> 45 %) buffers, without using a reducing agent thus showing the importance of non-covalent and electrostatic interactions in maintaining the gel structure. As conclusion, the presence of an EF during heating favor whey proteins water binding properties resulting in a more stable dispersions of β-lactoglobulin aggregates with different mechanical and microstructual features.